The following table shows the average heights (y cm) for given ages (x years) in a population of trees.

<table>
<thead>
<tr>
<th>Age (x years)</th>
<th>6</th>
<th>10</th>
<th>14</th>
<th>18</th>
<th>22</th>
</tr>
</thead>
<tbody>
<tr>
<td>Heights (y cm)</td>
<td>79.6</td>
<td>112.4</td>
<td>140.9</td>
<td>180.1</td>
<td>202.7</td>
</tr>
</tbody>
</table>

a) The relationship between the variables is modelled by the regression equation $y = ax + b$.

(i) Write down the value of $a$ and of $b$.

(ii) Hence, estimate the height of a tree that is 12 years old.

b) (i) Write down the correlation coefficient

(ii) State which **two** of the following describe the correlation between the variables.

<table>
<thead>
<tr>
<th>Strong</th>
<th>Zero</th>
<th>Positive</th>
</tr>
</thead>
<tbody>
<tr>
<td>Negative</td>
<td>No correlation</td>
<td>Weak</td>
</tr>
</tbody>
</table>

**Entering in data into the GDC**

**KEY NOTE:** You have to turn “diagnostic on” on your GDC in order to get the all the linear regression data to display.

**TI-83+ and some TI-84 versions:**

1. `2nd` brings up catalog function on GDC → scroll down to DiagnosticOn
2. using the down arrow on GDC → select DiagnosticON → DiagnosticOn

**TI-84 newer versions:**

1. scroll down to STATDIAGNOSTICS and select ON
ENTER DATA INTO A TABLE:

<p>| | | |</p>
<table>
<thead>
<tr>
<th></th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>6</td>
<td>79.6</td>
<td></td>
</tr>
<tr>
<td>10</td>
<td>112.4</td>
<td></td>
</tr>
<tr>
<td>14</td>
<td>140.9</td>
<td></td>
</tr>
<tr>
<td>18</td>
<td>180.1</td>
<td></td>
</tr>
<tr>
<td>22</td>
<td>208.7</td>
<td></td>
</tr>
</tbody>
</table>

DISPLAYING LINEAR REGRESSION VALUES:

scroll to the CALC then scroll down to LinReg (ax+b)

LinReg
y=ax+b
a=7.8475
b=33.275
r²=0.9952113642
r=0.9976028088

Answering the questions above:

a)  (i) $a = 7.85$ and $b = 33.3$

(ii) $x = 12$, enter the value 12 into the linear regression equation (use entire values of $a$ and $b$)

\[ y = 7.8475 \times 12 + 33.275 \]
\[ y = 127.445 \]
\[ y = 127 \text{ (3 sig figs)} \]

b)  (i) $r = 0.9976028088$

\[ r = 0.998 \text{ (3 sig figs)} \]

(ii) Strong ($r > 0.8$) and positive ($r > 0$)